

## Exponential Functions

Objective: Graph Exponential Functions; Equations with x and y interchanged; Applications of Exponential Functions

### Exponential Function (pg. 596 – 600)

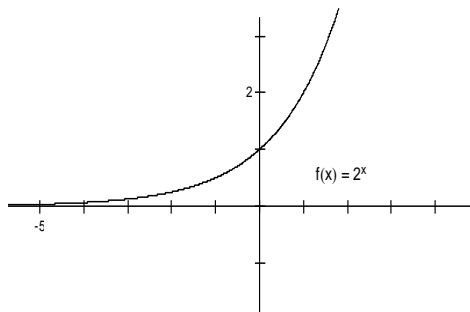
A function of the form  $f(x) = a^x$  is called an exponential function if  $a > 0$ ,  $a \neq 1$ , and  $x$  is a real number. This is called the exponential function with base  $a$ .

$$f(x) = a^x, \quad a > 0, \quad a \neq 1$$

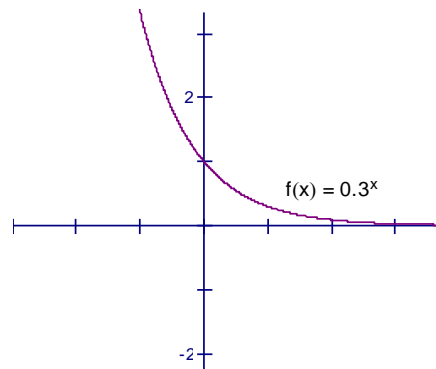
One-to-one function domain  $(-\infty, \infty)$  and range:  $(0, \infty)$

y-intercept  $(0, 1)$

no x-intercept



$$f(x) = a^x, \quad a > 1$$



$$f(x) = a^x, \quad 0 < a < 1$$

**Graph** the exponential function given by  $y = f(x) = 2^x$

**Graph**  $y = f(x) = \left(\frac{1}{2}\right)^x$

**Graph**  $y = f(x) = 2^{x-2}$

**Graph**  $x = 2^y$

### **Applications of Exponential Functions**

**Example:** The amount of money  $A$  that a principal  $P$  will be worth after  $t$  years at interest  $I$ , compounded annually, is given by the formula

$$A = P(1+i)^t$$

Suppose that \$100,000 is invested at 8% interest, compounded annually

- a) Find a function for the amount in the account after  $t$  years.
- b) Find the amount of money in the account at  $t = 0$ ,  $t = 4$ ,  $t = 8$ , and  $t = 10$ .
- c) Graph the function.